CLAIMS:

1. A receiving method in a direct conversion receiver, the method comprising:

receiving a signal comprising multiple components at different receiving frequencies belonging to a frequency band;

mixing at least one of the received signal components into a corresponding base band signal comprising I- and Q branches;

converting the analog base band signal into a digital signal;

measuring power levels of the signal components in the digital signal in pairs, where a first component in a pair belongs to an upper sideband of the frequency band and a second component in the pair belongs to a lower sideband of the frequency band;

estimating, when either the upper sideband component or the lower sideband component dominates in power over another component in the pair, a frequency-independent phase imbalance, a frequency-dependent phase imbalance and a gain imbalance;

compensating the estimated frequency-independent phase imbalance, the frequency-dependent phase imbalance and the gain imbalance to at least one of the I- and Q-branch signals.

2. The method of claim 1, wherein the step of estimating further comprises:

transforming the I- and Q-signals into frequency domain using a discrete Fourier transform or a fast Fourier transform to provide signals X(f) and Y(f);

estimating the frequency-dependent phase imbalance and the frequency-independent phase imbalance from the phase of the cross-spectrum (X(f)Y*(f)),

wherein X(f) and Y(f) denote the corresponding base band signals.

3. The method of claim 2, wherein the step of estimating comprises estimating the frequency-dependent phase imbalance and the frequency-independent phase imbalance from the phase of the averaged cross-spectrum <X(f)Y*(f)>.

4. The method of claim 1, wherein the step of estimating comprises estimating signal component-specific frequency-dependent phase imbalances when either the upper or the lower sideband signal component present in the pair dominates in power over the another component, and

estimating the frequency-independent phase imbalance as an average over the component-specific frequency-dependent phase imbalances.

5. The method of claim 1, wherein the step of estimating comprises estimating signal component-specific frequency-dependent phase imbalance factors when either the upper or the lower sideband signal component in the pair dominates in power over the another component; and

estimating the frequency-dependent phase imbalance as half of a difference between the component-specific frequency-dependent phase imbalance factors.

6. The method of claim 1, wherein the estimating step comprises

estimating signal component-specific frequency-dependent phase imbalances when either the upper or the lower sideband signal component of the pair dominates in power over the another component; and

estimating the frequency-independent phase imbalance from one or several of the component-specific frequency-dependent phase-imbalances by fitting techniques.

7. The method of claim 1, wherein the compensating step comprises compensating for the frequency-dependent phase imbalance and for the gain imbalance by digital filtering.

8. The method of claim 7, wherein the compensating step comprises compensating for the frequency-independent phase imbalance by subtracting the frequency independent phase imbalance from the outcome of the digital filtering.

9. A direct conversion receiver, comprising:

receiving means for receiving a signal comprising multiple components at different receiving frequencies belonging to a frequency band;

mixing means for mixing at least one of the received signal components into a corresponding base band signal comprising I- and Q branches;

converting means for converting the analog base band signal into a digital signal;

wherein the receiver comprises

measuring means for measuring power levels of the signal components in the digital signal in pairs, where a first component in a pair belongs to an upper sideband of the frequency band and a second component in the pair belongs to a lower sideband of the frequency band;

means for estimating, when either the upper sideband component or the lower sideband component dominates in power over another component in the pair, a frequency-independent phase imbalance, a frequency-dependent phase imbalance and a gain imbalance; and

compensating means for compensating the estimated frequency-independent phase imbalance, the frequency-dependent phase imbalance and the gain imbalance to at least one of the I- and Q-branch signals.

10. The direct conversion receiver of claim 9, wherein the estimating means is configured to:

transform the I- and Q-signals into frequency domain using discrete Fourier transform or fast Fourier transform to provide signals X(f) and Y(f);

estimate the frequency-dependent phase imbalance and the frequency-independent phase imbalance from the phase of the cross-spectrum (X(f)Y*(f)),

wherein X(f) and Y(f) denote the corresponding base band signals.

11. The direct conversion receiver of claim 10, wherein the estimating means estimates the frequency-dependent phase imbalance and the frequency-independent phase imbalance from the phase of the averaged cross-spectrum <X(f)Y*(f)>.

12. The direct conversion receiver of claim 9, wherein the estimating means is configured to:

estimate signal component-specific frequency-dependent phase imbalances when either upper- or lower sideband signal component present in the pair dominates in power over the another component; and

estimate the frequency-independent phase imbalance as an average over the component-specific frequency-dependent phase imbalances.

13. The direct conversion receiver of claim 9, wherein the estimating means is configured to:

estimate signal component-specific frequency-dependent phase imbalance factors when either the upper- or the lower sideband signal component in the pair dominates in power over the another component; and

estimate the frequency-dependent phase imbalance as a half of the difference between the component-specific frequency-dependent phase imbalance factors.

14. The direct conversion receiver of claim 9, wherein the estimating means is configured to:

estimate signal component-specific frequency-dependent phase imbalances when either the upper- or the lower sideband signal component of the pair dominates in power over the another component; and

estimate the frequency-independent phase imbalance from one or several of the component-specific frequency-dependent phase-imbalances by fitting techniques.

15. The direct conversion receiver of claim 9, wherein the compensating means is configured to:

compensate for the frequency-dependent phase imbalance and for the gain imbalance by digital filtering.

16. The direct conversion receiver of claim 15, wherein the compensating means if configured to:

compensate for the frequency-independent phase imbalance by subtracting the frequency independent phase imbalance from the outcome of the digital filtering.

17. A direct conversion receiver, comprising:

a receiver to receive a signal comprising multiple components at different receiving frequencies belonging to a frequency band;

a mixer to mix at least one of the received signal components into a corresponding base band signal comprising I- and Q branches;

an analog-to-digital converter to convert the analog base band signal into a digital signal;

wherein the receiver comprises

a measuring unit to measure power levels of the signal components in the digital signal in pairs, where a first component in the pair belongs to an upper sideband of the frequency band and a second component in the pair belongs to a lower sideband of the frequency band;

an estimator to estimate, when either the upper sideband component or the lower sideband component dominates in power over another component in the pair, a frequency-independent phase imbalance, a frequency-dependent phase imbalance and a gain imbalance; and

a compensator to compensate the estimated frequency-independent phase imbalance, the frequency-dependent phase imbalance and the gain imbalance to at least one of the I- and Q-branch signals.